



**Outsourcing in
The Chemical Industry**

**From Short-term Tactic
to Long-term Strategy**

Michael Reardon
Dow Contract Manufacturing Services



Yesterday's Situation

- For years, outsourcing was a tactical decision, often made at the last minute by manufacturing function to outsource:
 - **Toll synthesis**
 - **Compounding**
 - **Packaging**
 - **Specialty Synthesis (high pressure, difficult chemistry)**
 - **Capital investment “bridge” synthesis**
- Was typically a short term answer to an acute situation.
- Was usually rectified long-term by vertical integration.



Today's Situation

- Downsizing and focus were primary drivers of the '90's.
- Drove companies to critically evaluate key elements of *cost* and *value-delivery*.
- Had to answer the questions: “What are we really world class at doing? *What* will our customers *pay* for us to be world class in?”
- For many, the answer was *not* chemistry or chemical manufacturing and process development.
- *Tactical* outsourcing has been replaced by *strategic* outsourcing for many of these companies
- Outsourcing becoming an integral part of their total value delivery/supply chain activities



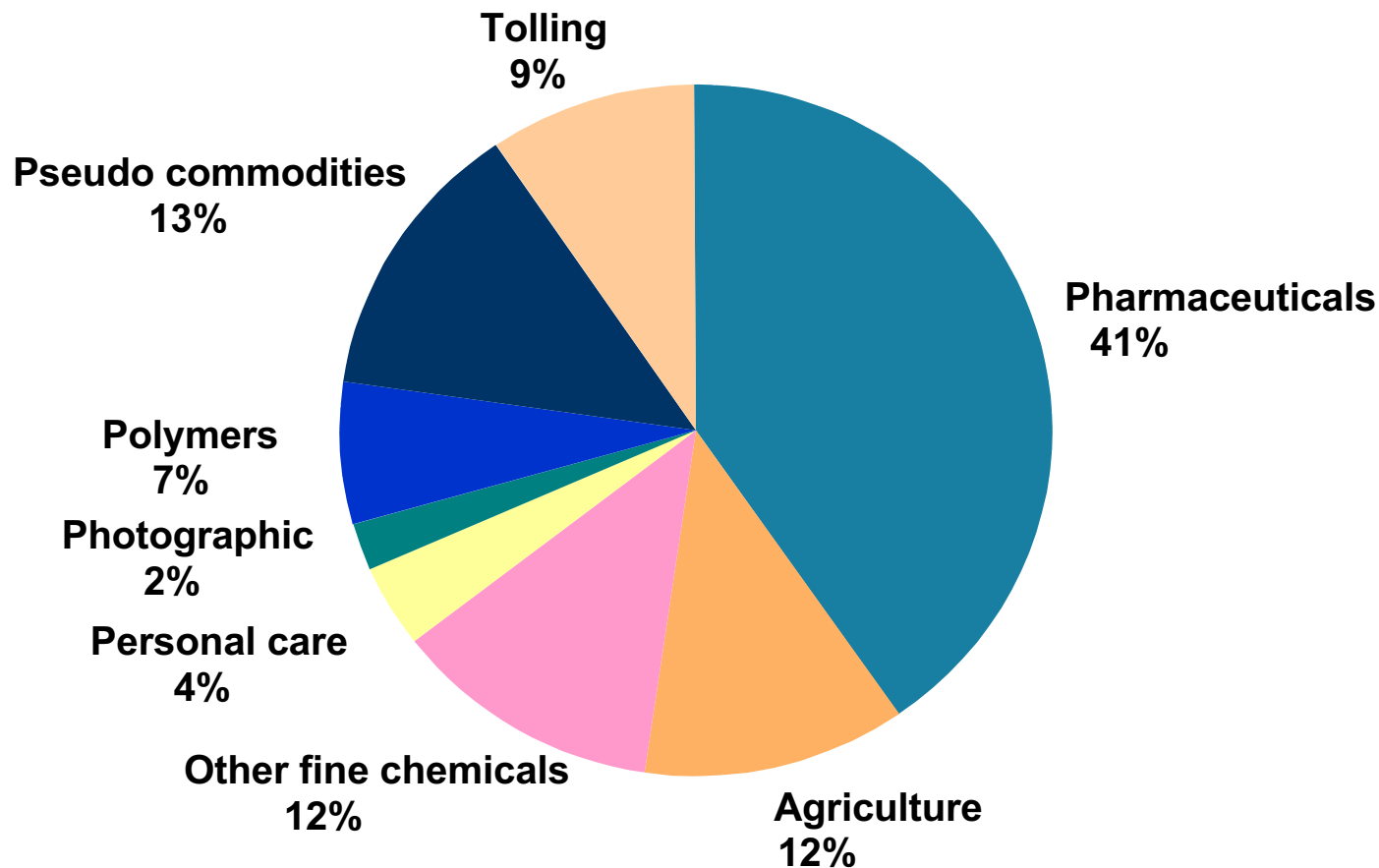
Chemical Outsourcing Today

- Focused on manufacturing and process development of specific compounds/products across many industries:
 - **Pharmaceutical--Both *Big Pharma* and *Virtual Pharma***
 - **Agro-Chemical**
 - **Household and Personal Care**
 - **Photographic**
 - **Polymers**
 - **Flavors and Fragrances**
 - **Dyes and Pigments**
 - **Chemical Processing Industry (CPI)**



A Large + Growing Industry*

— Market Size \$75-125 Billion —



*8-10% growth rate with subsegments such as bio/pharma at 15-25%



Evidence of Acceptance

— INFORMEX™ Attendee + Exhibitor Trends —

	'96	'97	'98	'99	'00	'01	
Attendees	2065	2065	2550	3073	3700	4100	+100%
Exhibitors	237	289	315	370	418	437	+ 83%

Informex is a registered trademark of the Synthetic Organic Chemical Manufacturers Association



Drivers to Outsourcing

- Increased speed to market
- Access to world class *technology*/global manufacturing *infrastructure*
- Greenfield facilities with associated environmental compliance issues are problematic
- Focus on core competencies - Discovery & Marketing
- Total cost savings and balance sheet improvement
- Cost of building and maintaining core competency in chemical synthesis and process development prohibitive for many.



Risk/Benefit Review

Expected Benefits

- Reduced time to market.
- Access to world class technology
- Access to focused, flexible manufacturing infrastructure.
- Lower capital investment, higher ROI. (capital risk)
- Lower total cost.
- Cost to maintain chemical manufacturing expertise is mitigated.

Perceived Risks

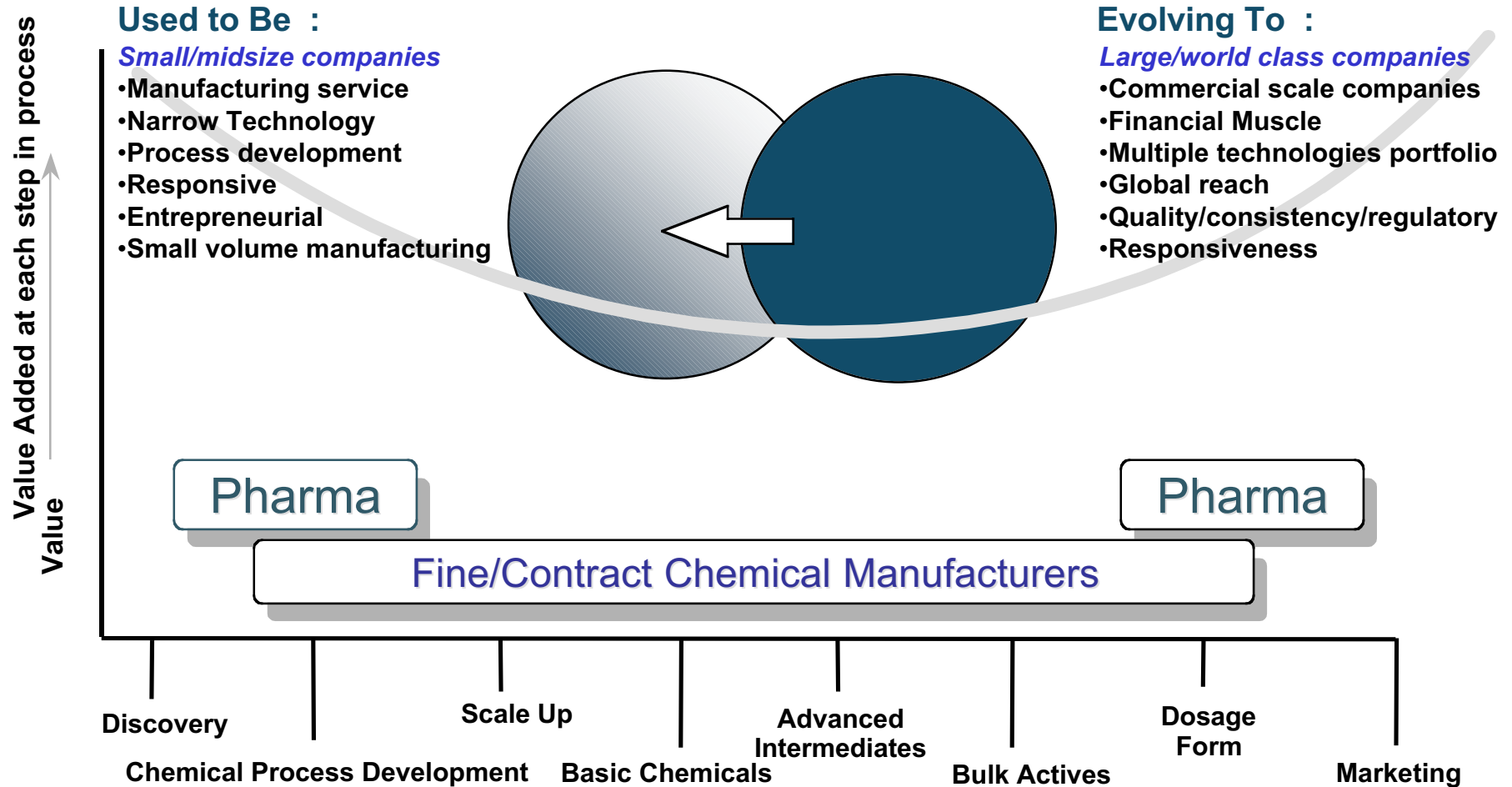
- Loss of control.
- Atrophy of “critical” manufacturing skills.
- Regulatory risk (both product and long term liability).
- “Leaking” Intellectual Property or being “Boxed In” by third party providers.
- ***Much is NOT true for emerging Virtual Pharma companies...never had it/never will***

Have to ask “Will my customer pay a premium for us to maintain top-tier chemical manufacturing capability or will my competitors gain an edge because they can access the best through outsourcing?”



Example: Emerging Pharmaceutical Industry Value Chain

*Source: Kline & Company, Inc./Dow Modified

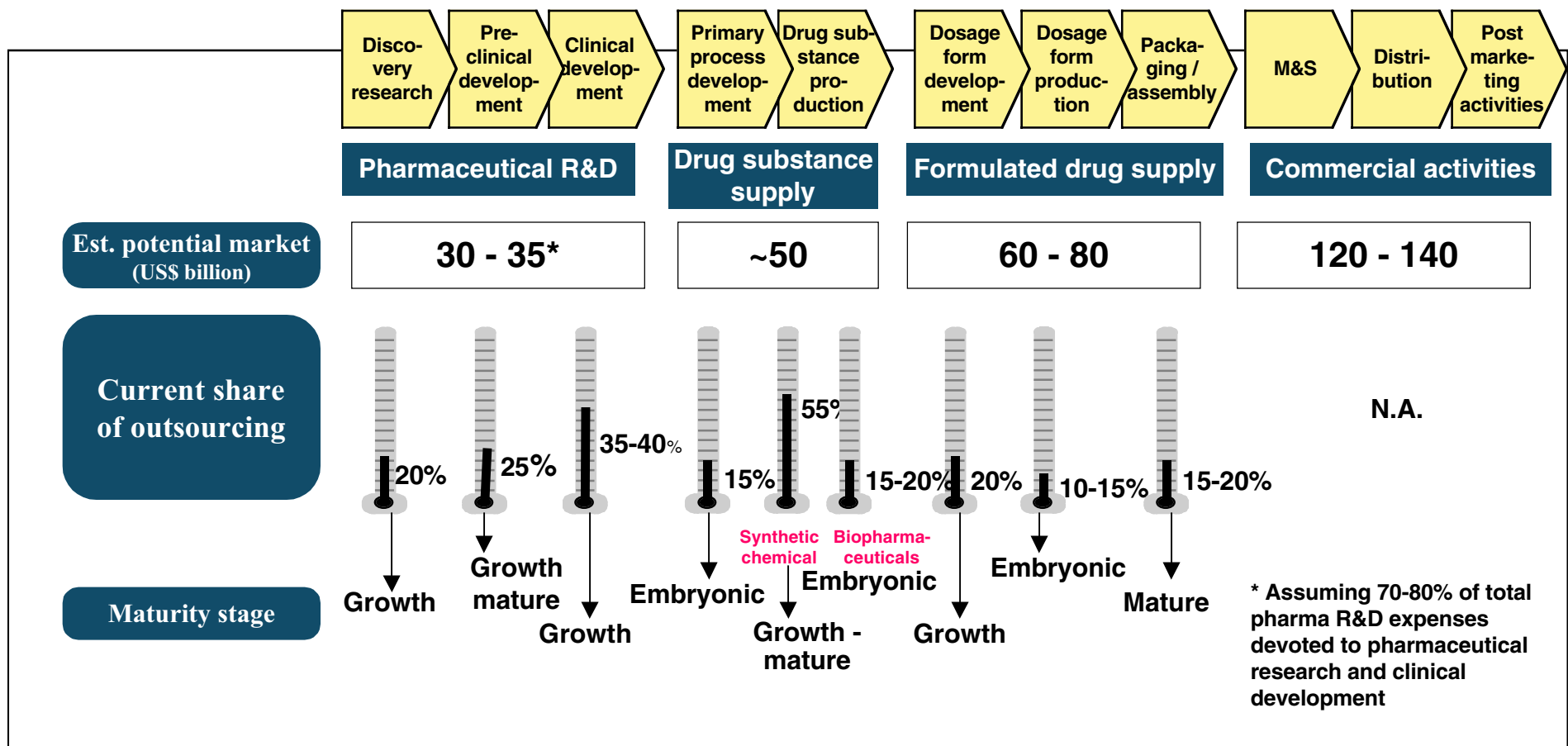




Pharmaceutical Industry Example

The potential value associated with outsourcing R&D and manufacturing operations is US\$ 120-130 billion - the current share of outsourcing being around 20-25%.

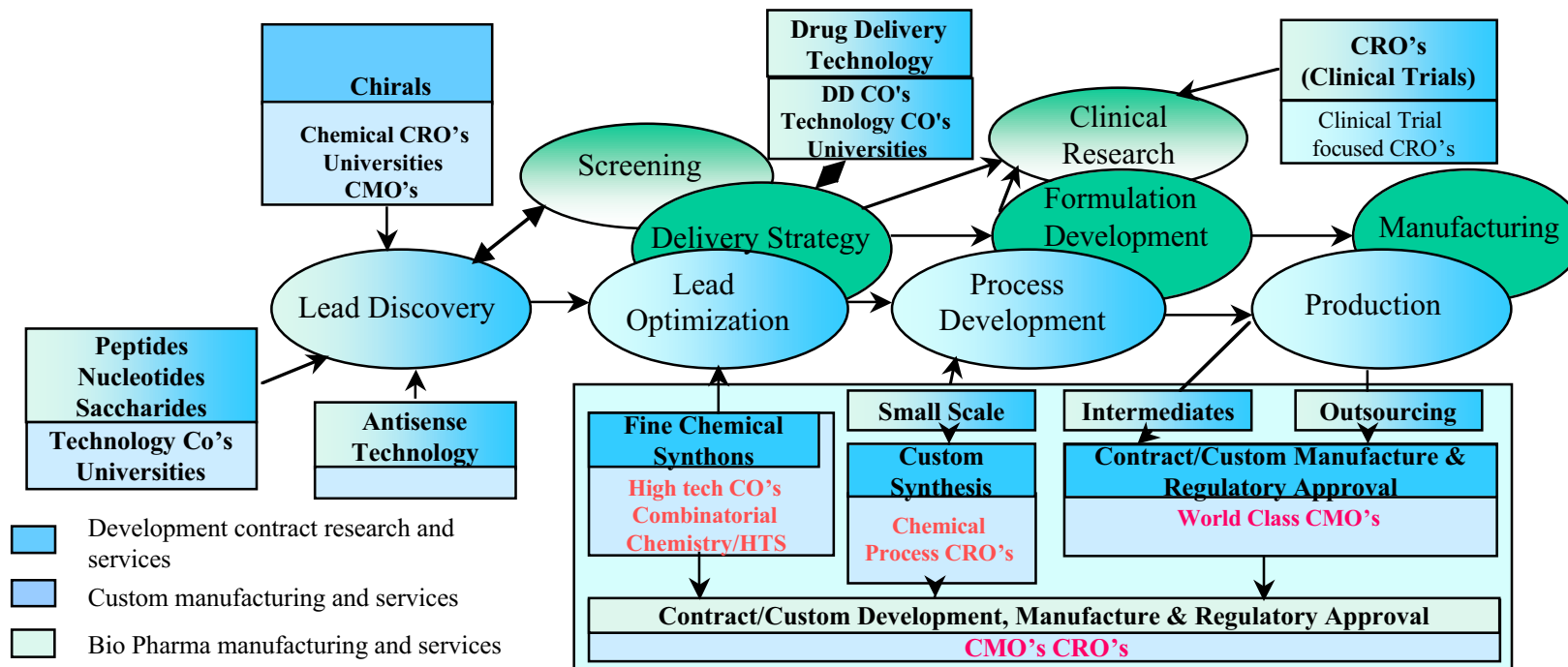
Outsourcing in the pharmaceutical industry



Source: AD Little



How Networked Alliances Reduce Time to Market



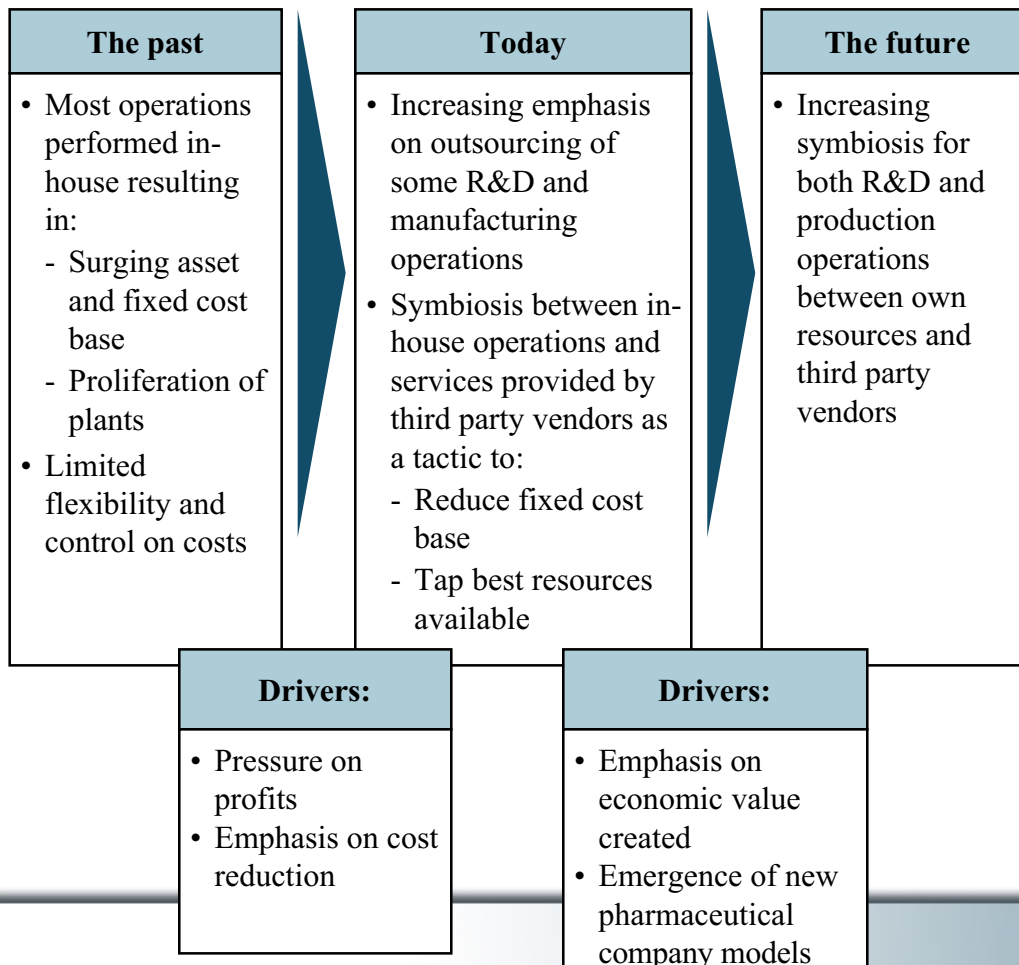
- Collaboration allows seamless transfer of technology from phase to phase.
- Maintains integrity of Intellectual Property
- Compresses timeline
- Parallel collaborative development -vs.- serial handoffs

Emerging business model...appearing through acquisitions or strategic alliances



Pharmaceutical Industry Example

The pharmaceutical industry is reassessing its mode of operation in R&D and supply chain management.



■ **Traditionally limited constraints facing the pharmaceutical industry in terms of access to own resources given:**

- Ample profit margins
- Moderate competitive intensity
- Rapid growth of the demand

■ **Escalating competitive intensity leading to a reassessment of operations in order to:**

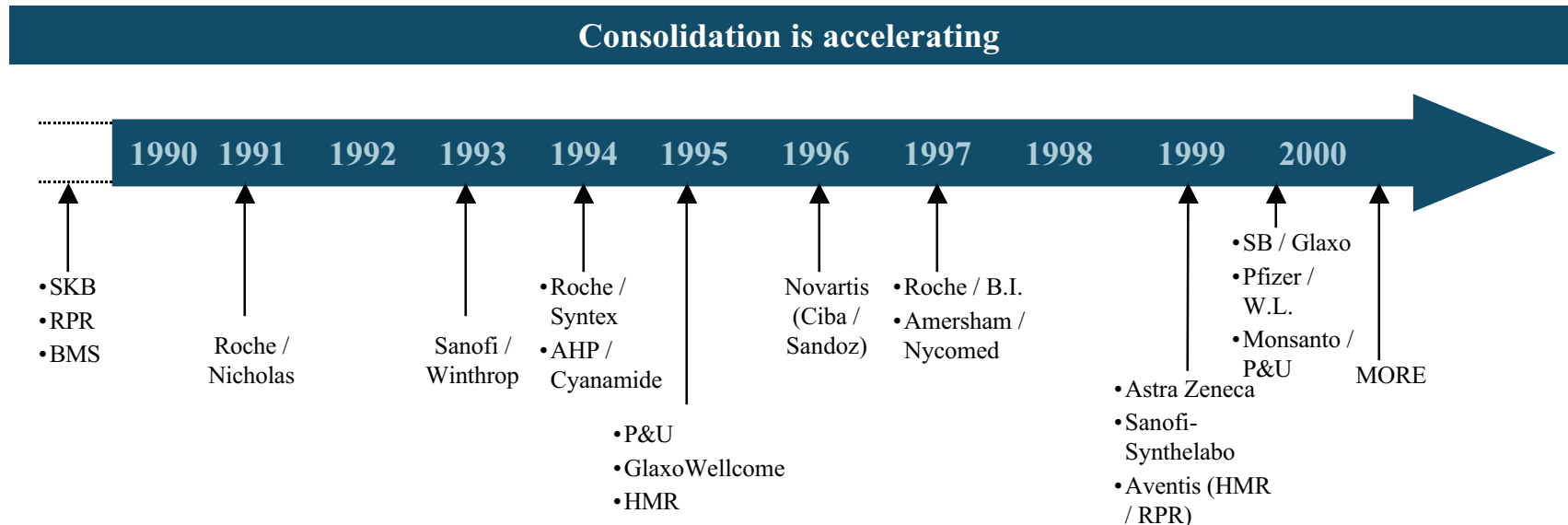
- reduce the inflation of the pharmaceutical company internal fixed cost base
- secure access to leading edge technology and resources when and where needed

Source: A.D. Little



Macro-developments

Consolidation is accelerating among global players.



- In the past--highly fragmented industry with market share of the five top players not exceeding 25%
- Over the past decade, creation of “mega” pharmaceutical players through mergers and acquisitions, a trend expected to further continue.
- Parallel to this, some players re-focusing activities on the pharma sector, divesting or spinning-off their other life science businesses.

Examples:

- the spin-off and merger of Novartis and Zeneca Agri business to create Syngenta
- announcement by AHP to divest agchem activities

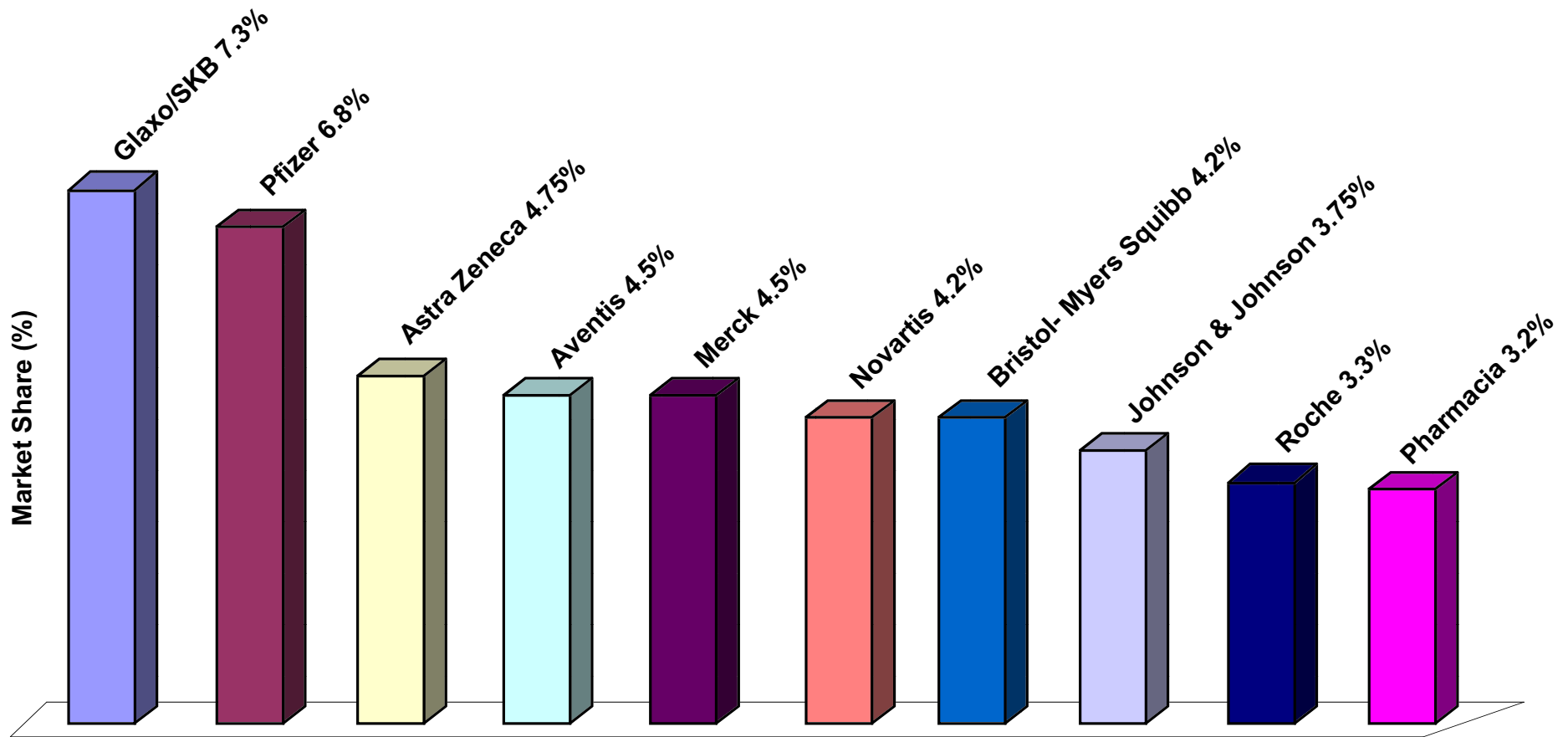
Source: AD Little



Pharmaceutical Industry:2000

Highly competitive, still fragmented, but consolidating

10 companies comprise ~45% of the global market





Impact of Pharmaceutical Industry Consolidation on Fine/Custom Chemical Suppliers

- Top 10 suppliers now have 25% of total market
- Developing innovation and early stage development capabilities
- Broadening their technology toolkits
- Collaborating with other outsourcing partners throughout the value chain
- Fostering global relationships with pharmaceutical companies
- Creating networked relationships with service providers

Conclusion: The need for “critical mass” is driving consolidation among fine/contract chemical industry



Top Players in Fine Chemicals/Contract Manufacturing 2001

- **DSM/Catalytica (acquisition 2000)**
- **Lonza**
- **Clariant/BTP (acquisition 2000)**
- **Rhodia/ChiRex (acquisition 2000)**
- **Degussa-Huels/SKW (merger/acquisition 2000/01)**
- **Cambrex**
- **Dow CMS**
- **Eastman**
- **Laporte**
- **PPG/Sipsey**
- **Bayer**
- **Great Lakes**
- **BASF**
- **Honeywell**
- **Sigma Aldrich**



Pharmaceuticals Lead...

But chemical outsourcing is much more than pharma

- Over half of chemical industry outsourcing occurs in non-pharmaceutical areas
- Growing reliance on outsourcing and strategic partnerships to reduce cost, expand into new geographies and speed new products to market.
- Drivers are the same...lower cost, reduced capital risk, speed to market, access to technology, raw materials and manufacturing infrastructure.



Dow CMS is leveraging the capabilities and resources from the whole of The Dow Chemical Company to create solutions to customers' chemical synthesis needs.

Dow Businesses Historically

Aspirin - 1916
Human Health - 1970's
Dow Lepetit - 1970's
Marion Merrell Dow - 1980's-1995
Industrial and Specially chemicals, plastics, polymers and Ag products --100+ years

CMS - 1995

Dow Work Processes

- Manufacturing Capability
- Technology
- Site/Raw Mtrl Integration
- Process Development
- Related Services (Regulatory, etc.),

Customer Products

Pharma, Ag
Personal care
CPI industry,
other
Customers

Dow Products

Aspirin
Novahistine Lorelco
Chloramfinicol
Seldane, Citrucel ,Ranitidine
Cardizem Dolasetron
Industrial and Specially chemicals, plastics, polymers and Ag products -- 100+ years



Summary

- Chemical contract manufacturing industry continues to be driven by technology and economic factors.
- Similar drivers to those in the electronics industry...but about 5-10 years behind the business model.
- Expectations are for continued growth and consolidation.
- Expect collaborations and alliances to become increasingly important to creating a dynamic network of service.
- “Don’t have to own it to leverage it”...acquisitions are risky and expensive
- Expect 5-6 mega-players to emerge over the next 5 years (similar to electronics experience)
- Solid business opportunity for companies broad and deep in technology, infrastructure and global reach



“Immunex Races to Meet Demand for Biotech Drug”

■ ***“Enbrel™ (severe arthritis) a Big Hit, Could Presage Similar Supply Problems As Genetic Drugs Take Off”***

- Two years after intro, Enbrel selling at \$750MM clip
- Fastest biotech launch ever...demand has skyrocketed....
- Nov. 2000, company asked patients to register so company wouldn't run out of the drug.
- **BIG PROBLEM:**
 - *Very Difficult to forecast uptake on new drugs*
 - *Gearing up to manufacture gene-based drugs even more difficult than traditional pharmaceuticals.*

Enbrel is a trademark of Immunex Corp.



High Capital Risk leads to caution:

- **To have enough, Immunex would have had to start building a \$400MM production plant in 1996! (takes that long to build and validate for FDA approval)**
- ***That's too risky--many drugs that reach that late stage of FDA approval fail due to unforeseen side effects....***

So, what do you do???



What Immunex did to ramp up production....FAST....?

- Signed a *contract manufacturing* deal with Boehringer Ingelheim (Germany) to manufacture at their existing facility in Europe.
- Saved both time and money versus building new.
- Now, BI is running out of capacity, so Immunex is retrofitting a facility in Rhode Island....production up by middle of 2002 allowing Immunex to catch up with demand.
- *WSJ* reports analysts say Immunex will “leave more than \$200MM in sales on the table this year--and leave the door open for competition”

Is there value in flexible contract manufacturing helping to balance risk and level peaks and valleys in demand???